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263. Proposed by O. E. GLENN, Ph. D., Springfield, Mo.

Express the transcendentals  $e$  and  $\pi$  in the form of infinite continued fractions.

264. Proposed by O. E. GLENN, Ph. D., Springfield, Mo.

Express the invariant  $2(a_0a_4 - 4a_1a_3 + 3a_2^2)$  of the binary quartic  $a_0x_1^4 + 4a_1x_1^3x_2 + 6a_2x_1^2x_2^2 + 4a_3x_1x_2^3 + a_4x_2^4$  in terms of roots of the latter.

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### AVERAGE AND PROBABILITY.

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177. Proposed by J. EDWARD SANDERS, Reinersville, Ohio.

Two random planes cut a given sphere. What is the chance that they intersect within the sphere?

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### CALCULUS.

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220. Proposed by C. N. SCHMALL, College of the City of New York, New York City.

To determine the least polygon of  $n$  sides that can be described about a given circle.

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### DIOPHANTINE ANALYSIS.

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135. Proposed by A. H. HOLMES, Brunswick, Maine.

In the equation in Diophantine Analysis:  $2x^2 + 2x + 1 = \square = u^2$ , show that  $u$  is always the sum of two squares.

136. Proposed by A. H. HOLMES, Brunswick, Maine.

Given  $7x^2 - 111 = y^2$ . Required a value for  $y$  greater than unity which shall be a prime integer.

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### GEOMETRY.

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288. Proposed by C. N. SCHMALL, College of the City of New York, New York City.

From a point  $P$  on a given circle to draw two chords such that, ( $\alpha$ ) chord  $PA : \text{chord } PB = m : n$  ( $a$  given ratio), and, ( $\beta$ ) arc  $PA : \text{arc } PB = 1 : 3$ .

289. Proposed by J. J. QUINN, Ph. D., Warren, Pa.

(a) Suppose a circle described around the origin. Then at the end of a uniformly revolving radius  $r$ , a line equal to the diameter is pivoted. Find the equation of the locus of its extremity, if for every unit of angle its projection on the  $X$  axis is a constant linear unit, being the same part of the diameter as the angle is of  $\pi$  radians.

(b) Show how it can be applied to the trisection or multisection of an angle.

290. Proposed by G. W. GREENWOOD, M. A., McKendree College, Lebanon, Ill.

Show that the point  $(1, 1)$  is a conjugate point on the locus  $x^3 + y^3 - 3xy + 1 = 0$ .

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### MISCELLANEOUS.

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158. Proposed by THEODORE L. DeLAND, Treasury Department, Washington, D. C.

In ingot of pure gold was melted at the Mint and then 10 ounces were taken out and 10 ounces of pure silver added and the contents of the melting pot mixed thoroughly. This was repeated until there were 10 such operations in all. The contents of the pot being then assayed was found to be nine-tenths fine, or standard gold. What was the weight of the original ingot? There was no loss in the precious metals by the melting.

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### UNSOLVED PROBLEMS.

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NOTE. The following problems still remain unsolved (in our columns).

Diophantine Analysis, No. 132. Proposed by DR. OSWALD VEBLEN, Princeton University, Princeton, N. J.

From the numbers, 0, 1, 2, ....., 42, select seven, such that the 42 differences of these seven numbers shall be congruent (mod. 43) to the numbers 0, 1, 2, ....., 42. The differences may be both positive and negative.\*

Mechanics, No. 188. Proposed by H. L. ORCHARD, M. A., B. Sc. (Unsolved problem in Educational Times, London.)

Spherical bubbles are rising in water. Find the relation between radius and velocity.

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### NOTES AND NEWS.

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Professor J. H. Jeans of Princeton University, has been elected fellow of the Royal Society of London.

Dr. E. B. Wilson has been promoted to an assistant professorship of mathematics at Yale University.

Dr. Oliver E. Glenn has been appointed instructor in mathematics in the University of Pennsylvania.

Professor W. J. Hussey, of Lick Observatory, has been appointed professor of astronomy at the University of Michigan.

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\*These problems involve important principles. Solutions have been contributed, but all incorrect. Will some reader make a study of them? ED. G.